



**Energy Efficiency and Renewable Energy
Federal Energy Management Program**

How to Buy an Energy-Efficient Gas Water Heater

Why Agencies Should Buy Efficient Products

- Executive Order 13123 and FAR section 23.704 direct agencies to purchase products in the upper 25% of energy efficiency, including all models that qualify for the EPA/DOE ENERGY STAR® product labeling program.
- Agencies that use these guidelines to buy efficient products can realize substantial operating cost savings and help prevent pollution.
- As the world's largest consumer, the federal government can help "pull" the entire U.S. market towards greater energy efficiency, while saving taxpayer dollars.

Federal Supply Source:

- General Services Administration (GSA)
Phone: (817) 978-2316

For More Information:

- DOE's Federal Energy Management Program (FEMP) Help Desk and World Wide Web site have up-to-date information on energy-efficient federal procurement, including the latest versions of these recommendations.
Phone: (800) 363-3732
www.eren.doe.gov/femp/procurement
- American Council for an Energy-Efficient Economy (ACEEE) publishes the *Consumer Guide to Home Energy Savings*.
Phone: (202) 429-0063
aceee.org
- Gas Appliances Manufacturers Association (GAMA) publishes the *Consumer's Directory of Certified Efficiency Ratings*.
Phone: (703) 525-9565
www.gamanet.org
- *Home Energy* magazine provides energy conservation tips.
Phone: (510) 524-5405
www.homeenergy.org
- Lawrence Berkeley National Laboratory provided supporting analysis for this recommendation.
Phone: (202) 646-7950

Efficiency Recommendation

Product Type	Recommended		Best Available	
	Energy Factor ^a	Annual Energy Use ^b	Energy Factor	Annual Energy Use
First Hour Rating^c 48 – 86 gallons	0.61 or more	246 therms or less	0.65	230 therms

- a) Energy Factor measures the efficiency of the water heater by comparing the energy supplied in heated water to the total daily consumption of the water heater.
- b) Based on DOE test procedure, see 10 CFR 430, Sub-Part B, Appendix E.
- c) First Hour Rating is the amount of hot water the heater can supply per hour (starting with the tank full of hot water).

The federal supply source for residential-scale water heaters is the General Services Administration (GSA), which offers them through its "Special Order" program. Request models that meet this Efficiency Recommendation.

For water heaters purchased through commercial sources (retailer or distributor), look at the yellow "EnergyGuide" label to identify models that meet the recommended level. For a contractor-supplied water heater, specify an estimated annual energy use that meets this Efficiency Recommendation.

Selecting an oversized gas water heater, besides raising purchase cost, will result in increased energy costs due to excessive cycling and standby losses. ACEEE's *Consumer Guide* and GAMA's *Consumer's Directory* provide good, simple guidance on proper sizing of water heaters (see "For More Information"). The "capacity" of a gas water heater should be judged by its first hour rating (FHR), not its tank size. Due to larger burners, some gas water heaters with smaller tanks actually have higher capacities (FHRs) than models with larger tanks.

Where to Find Energy-Efficient Gas Water Heaters

Sizing

Where hot water demand is small, one cost-effective option is a “demand” (tankless) gas water heater. However, these can provide, at the most, only four to five gallons of heated water per minute (for reference, most showerheads draw about three gallons per minute; faucets usually draw between two and three gallons per minute at full capacity).

“Indirect” water heaters, which employ a tank but use the house’s boiler (or furnace) to heat the water, can be an energy-saving option, especially if the boiler or furnace is an efficient one. Some “integrated” models feature both hot water and space heating functions in the same compartment.

Depending on the climate and energy prices, a solar-assisted water heater may result in substantial energy savings.

Energy costs increase with higher water temperature settings; set the temperature at the lowest temperature that allows for sufficiently warm water, usually 110°F to 130°F. Turning gas water heaters down or off during vacations will save significantly on energy costs, also; if turned completely off, however, the pilot must be relit upon return.

Technology Options

User Tips

Gas Water Heater Cost-Effectiveness Example (40 gal. tank, 70 gal. First Hour Rating)

Performance	Base Model ^a	Recommended Level	Best Available
Energy Factor	0.54	0.61	0.65
Annual Energy Use	277 therms	246 therms	230 therms
Annual Energy Cost	\$111	\$98	\$92
Lifetime Energy Cost	\$1,200	\$1,050	\$1,000
Lifetime Energy Cost Savings	–	\$150	\$200

Definition

Lifetime Energy Cost is the sum of the discounted value of annual energy costs based on average usage and an assumed water heater life of 13 years. Future gas price trends and a discount rate of 3.4% are based on federal guidelines (effective from April, 2000 to March, 2001).

a) The efficiency (Energy Factor) of the Base Model is just sufficient to meet current U.S. DOE national appliance standards.

Cost-Effectiveness Assumptions

Annual energy use in this example is based on the standard DOE test procedure and is calculated assuming an inlet water temperature of 58°F, a water heater temperature setpoint of 135°F, daily hot water demand of 64 gallons, and 365 days per year of use. The assumed gas price is 40¢/therm, the federal average gas price in the U.S.

Using the Cost-Effectiveness Table

In the example above, a gas water heater with an Energy Factor of 0.61 is cost-effective if its purchase price is no more than \$150 above the price of the Base Model. The Best Available model, with an Energy Factor of 0.65, is cost-effective if its price is no more than \$200 above the price of the Base Model.

Metric Conversions

1 gallon = 3.8 liters
 1 therm = 100,000 Btu
 = 29.3 kWh
 = 105.5 MJ
 $^{\circ}\text{F} = (1.8 \times ^{\circ}\text{C}) + 32$

What if my Gas Price is different?

To calculate Lifetime Energy Cost Savings for a different gas price, multiply the savings by this ratio: $\left(\frac{\text{Your price in } \$/\text{therm}}{40.0 \text{ } \$/\text{therm}} \right)$.

